EXHIBIT G

California State Lands Commission Presurvey Notice Requirements for Permittees to Conduct Geophysical Survey Activities

All parts of the Presurvey Notice must be adequately filled out and submitted to the CSLC staff a minimum of twenty-one (21) calendar days prior to the proposed survey date to ensure adequate review and approval time for CSLC staff. Note that one or more of the items may require the Permittee to plan well in advance in order to obtain the necessary documentation prior to the Notice due date (e.g., permits from other State or Federal entities). Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Please use the boxes below to verify that all the required documents are included in the Presurvey Notice. If "No" is checked for any item, please provide an explanation in the space provided. If additional space is needed, please attach separate pages.

Yes	No	
X	☐	Geophysical Survey Permit Exhibit F
X	☐	Survey Location (including a full-sized navigation chart and GPS coordinates for each proposed track line and turning point) Explanation:_____
	X	Permit(s) or Authorization from other Federal or State agencies (if applicable) Explanation: _____
X	☐	21-Day Written Notice of Survey Operations to Statewide Geophysical Coordinator/
X	☐	U.S. Coast Guard Local Notice to Mariners/
X	☐	Harbormaster and Dive Shop Notifications Explanation:_____
X	☐	Marine Wildlife Contingency Plan Explanation:_____
X	☐	Oil Spill Contingency Plan Explanation:_____
X	☐	Verification of California Air Resources Board's Tier 2-Certified Engine Requirement Explanation:_____
X	☐	Verification of Equipment Service and/or Maintenance (must verify sound output) Explanation:_____
☐	X	Permit(s) or Authorization from California Department of Fish and Wildlife for surveys in or affecting Marine Protected Area(s) (if applicable). Explanation:

._____

NOTE: CSLC staff will also require verification that current biological information was obtained and transmitted as outlined in Section 5 of this permit

EXHIBIT F

PRESURVEY NOTIFICATION FORM

Applicant/Permittee's Mailing Address: Date: 9/7/18

Tim Elfers Jurisdiction: Federal ____State _X_Both ___

USGS

Pacific Coastal and Marine Geology If State: Permit #PRC 8394

2885 Mission Street Region: IV

Santa Cruz, CA 95060 Area: Northern CA/Southern OR

GEOPHYSICAL SURVEY PERMIT

Check one: _X_ New survey Time extension of a previous survey

U.S.G.S. Pacific Coastal and Marine Geology (Applicant/Permittee) will conduct a geophysical survey offshore California in the survey area outlined on the accompanying navigation chart segment. If you foresee potential interference with commercial fishing or other activities, please contact the person(s) listed below:

FEDERAL WATERS (outside 3 nautical miles)

1) Applicant's representative: Tim Elfers
2) Federal representative: U. S. Geological Survey

NOTE: Any comments regarding potential conflicts in Federal waters must be received by the Applicant's Representative and lead Federal agency within ten (10) days of the receipt of this notice.

STATE WATERS (Inside 3 nautical miles)

1) Permittee's representative: Tim Elfers
2) CSLC representative: Richard Greenwood

NOTE: Any comments regarding potential conflicts in State waters should be received as soon as possible by the Permittee's representative, no more than fifteen (15) days after the receipt of this notice.

1. Expected Dates of Operation: October 6 – 18, 2018.
2. Hours of Operation: 6AM to 7PM (daylight hours only)
3. Vessel Names: R/V Coral Sea
4. Vessel Official Number: 559373
5. Vessel Radio Call Sign: WCX9122
6. Vessel Captain's Name: Scott Martin
7. Vessel will monitor Radio Channel(s): 16
8. Vessel Navigation System: Differential GPS

Equipment to be used:

Edgetech 512s1 Chirp Sub bottom Profiler

a. Frequency (Hz, kHz): 200 kHz

a. Frequency (Hz, kHz): 0.5-12 kHz

b. Source level: (dB re 1 µPa at 1 meter (m) (rms): 198 dB RMS

c. Number of beams, across track beam width, and along track beam width:
1 beam, downward focused at 16-32 degrees depending on center frequency.

d. Pulse rate and length: 4.5-13.5pps at 5-50 milliseconds.

e. Rise time: 12 µ seconds

f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 uPa (rms) isopleths,
190 dB: 2.5M ; 180 dB: 8M ; 160 dB: 80M

These estimates are based on the underwater sound propagation equation:

RSPL= SL-20log (R/Ro)-AR, where

RSPL=recieved sound potential level

SL= RMS source level re. 1 uPa (rms) based on manufacturer's specifications

R= Distance

Ro= Reference Distance (1 m)

A= sound absorption coefficient

g. Deployment depth: 1 - 5 m

h. Tow speed: 3 - 5 knots

i. Approximate length of cable tow: _10m

Applied Acoustics CSP 2400 Sparker

a. Frequency (Hz, kHz): 300 Hz- 5kHz
b. Source level: (dB re 1 μPa at 1 meter (m) (rms): 226 dB RMS
c. Number of beams, across track beam width, and along track beam width:
   1 beam, omnidirectional
d. Pulse rate and length: 0.3-5.0 milliseconds depending on depth; 800 μ seconds pulse length.
e. Rise time: 7 μ seconds
f. Estimated distances to the 190 dB, 180 dB, and 160 dB re 1 uPa (rms) isopleths,
   190 dB: 6m ; 180 dB: 16m ; 160 dB: 166m

These estimates are based on the underwater sound propagation equation:

RSPL= SL-20log (R/Ro)-AR, where

RSPL=recieved sound potential level

SL= RMS source level re. 1 uPa (rms) based on manufacturer's specifications

R= Distance

Ro= Reference Distance (1 m)

A= sound absorption coefficient (0.06dB/km)

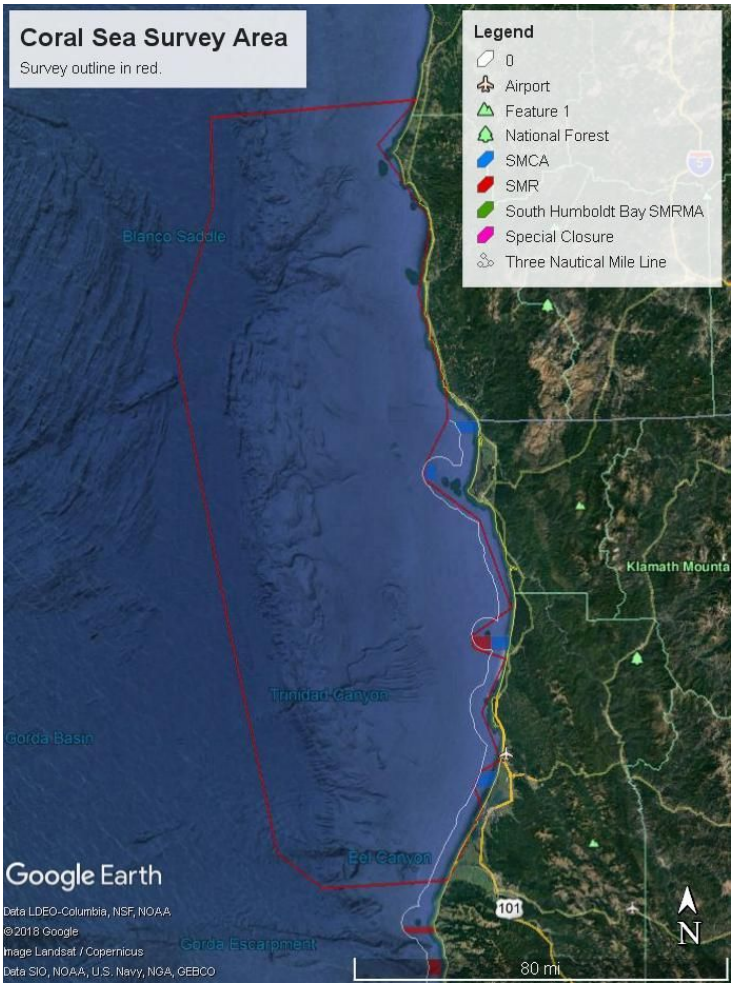
g. Deployment depth: 1 m
h. Tow speed: 4-5 knots
i. Approximate length of cable tow: 30 m.

Applicant's Representative:
Tim Elfers
US Geological Survey
2885 Mission Street
Santa Cruz, CA 95060
831-460-7479

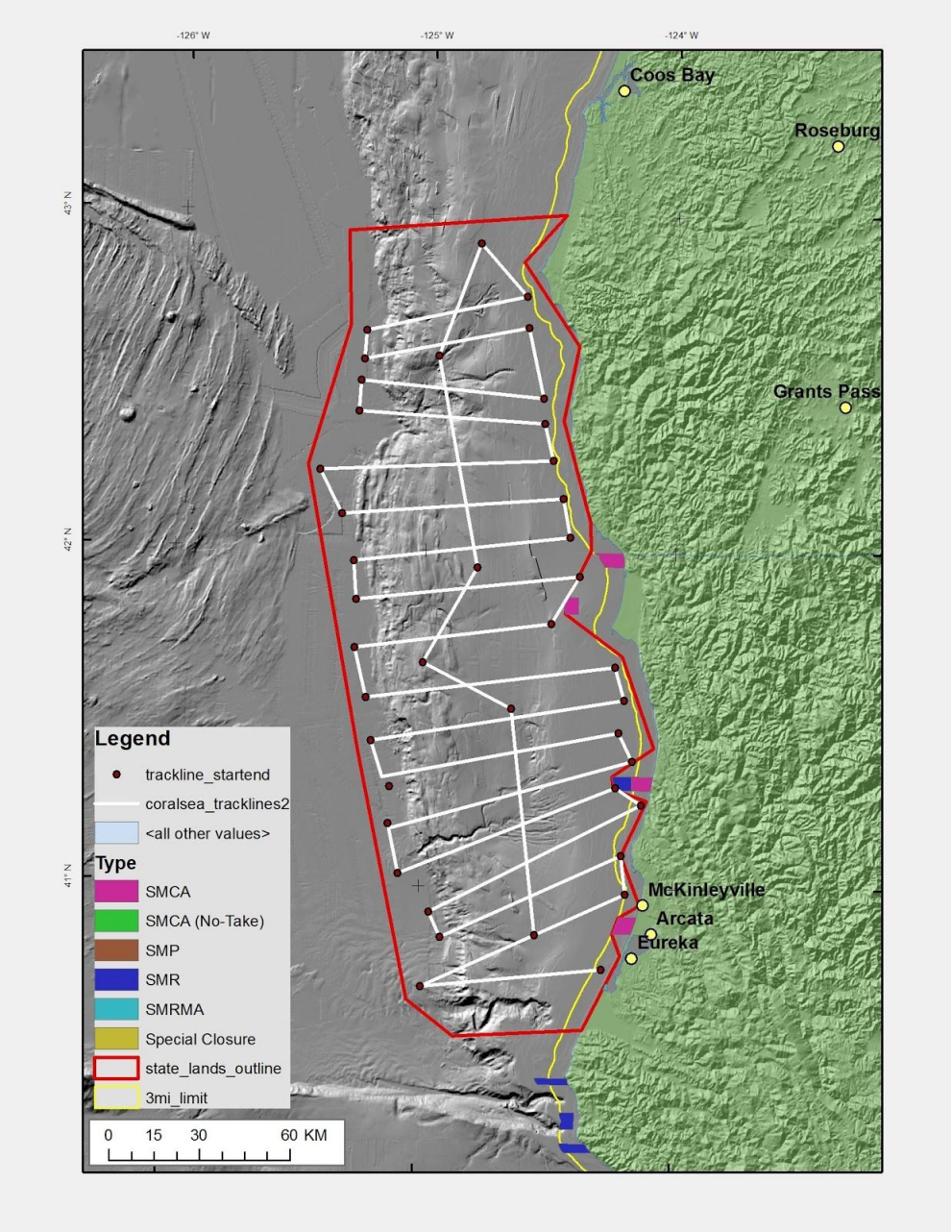
California State Lands Representative:
Richard B. Greenwood
Statewide Geophysical Coordinator
200 Oceangate, 12th Floor
Long Beach, CA 90802-4331
(562) 590-5201

BOEM Representative:
Joan Barminski
Chief, Office of Reservoir & Production
770 Paseo Camarillo
Camarillo, CA 93010
(805) 389-7707

Regional Map of Study Area



Detail Map of Study Area



The survey area is bounded by the coordinates:

Upper L: 42.9158, -125.433
Lower L; 40.7011, -125.433
Upper R: 42.9158, -124.128
Lower R: 40.7011, -124.128

Survey track line coordinates:

Line #	Start of trackline		End of trackline	
	start_lat	start_long	end_lat	end_long
0	40.76048	-124.278	40.70113	-124.986
1	40.70113	-124.986	40.98459	-124.189
2	40.98459	-124.189	41.09918	-124.204
3	41.09918	-124.204	40.85071	-124.913
4	40.85071	-124.913	40.92414	-124.959
5	40.92414	-124.959	41.25171	-124.128
6	41.25171	-124.128	41.30150	-124.231
7	41.30150	-124.231	41.03795	-125.084
8	41.03795	-125.084	41.18586	-125.128
9	41.18586	-125.128	41.38041	-124.165
10	41.38041	-124.165	41.46549	-124.220
11	41.46549	-124.220	41.29453	-125.125
12	41.29453	-125.125	41.43090	-125.202
13	41.43090	-125.202	41.56180	-124.200
14	41.56180	-124.200	41.65982	-124.237
15	41.65982	-124.237	41.55873	-125.228
16	41.55873	-125.228	41.70648	-125.276
17	41.70648	-125.276	41.78784	-124.494
18	41.78784	-124.494	41.92900	-124.384
19	41.92900	-124.384	41.84974	-125.274
20	41.84974	-125.274	41.96563	-125.288
21	41.96563	-125.288	42.04494	-124.424
22	42.04494	-124.424	42.16066	-124.453
23	42.16066	-124.453	42.10469	-125.340
24	42.10469	-125.340	42.23404	-125.433
25	42.23404	-125.433	42.27293	-124.497
26	42.27293	-124.497	42.38390	-124.533
27	42.38390	-124.533	42.41126	-125.282
28	42.41126	-125.282	42.50188	-125.275
29	42.50188	-125.275	42.45789	-124.540
30	42.45789	-124.540	42.66824	-124.603
31	42.66824	-124.603	42.56573	-125.264
32	42.56573	-125.264	42.65172	-125.259
33	42.65172	-125.259	42.76152	-124.614
34	42.76152	-124.614	42.91579	-124.802
35	42.91579	-124.802	42.58028	-124.965
36	42.58028	-124.965	41.95205	-124.794
37	41.95205	-124.794	41.66574	-125.004
38	41.66574	-125.004	41.53280	-124.649
39	41.53280	-124.649	40.85986	-124.542

Marine Wildlife Mitigation Plan
Geophysical imaging of geologic hazards offshore northern California and southern Oregon
(October 6 - 17th, 2018)

1.0 INTRODUCTION

This marine wildlife mitigation plan is prepared in compliance with the USGS Pacific Coastal and Marine Science Center's existing State Geophysical Permit PRC 8394. This plan is intended to provide guidance to USGS vessel operators and scientific field personnel collecting geophysical data for the Pacific Coastal and Marine Science Center (PCMSC) in Santa Cruz, CA to avoid significant impacts to marine wildlife that may occur during regular geophysical surveys.

1.1 Regulatory Basis

Species that are either currently in danger or soon likely to be in danger of extinction throughout all or a portion of its range are protected by the Endangered Species Act of 1973. The United States Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) implement the Endangered Species Act. During the consultation with NMFS to issue a permit for the offshore geophysical survey, it was determined no incidental take permits are required to use the equipment identified in this document to conduct scientific data acquisition in federal waters offshore of the California and Oregon coasts.

1.2 Geophysical Survey Purpose and Objectives

Subduction zone earthquakes, tsunamis, volcanoes, and landslides are some of the most dangerous and powerful natural hazards on Earth. The largest earthquakes on Earth occur within subduction zones at the interface between the downgoing and overriding plate. While locking and strain accumulation occurs in deeper regions, much of slip in megathrust earthquakes occurs at shallow depths along the plate interface, which has great potential to initiate large tsunamis associated with seafloor displacement. With an initial focus along the Cascadia margin, ongoing and planned work will provide key onshore/offshore constraints that feed directly into earthquake, tsunami, and landslide hazard assessments and situational awareness products.
Preliminary morpho-tectonic analyses highlight distinct along-strike variations in morphology along the Cascadia margin that may reflect spatial variations in megathrust behavior. Identification and regional mapping of active fault structures will provide insight to this segmentation pattern, earthquake recurrence intervals, stress/strain accommodation and variations in coastal uplift or subsidence. We plan to investigate the linkages between fluvial systems, dispersal pathways, tectonic basins, fault interactions, seafloor morphology, and offshore storage locations, which will help to identify basins prone to strong shaking, areas of the slope susceptible to landslides, and/or optimal environment(s) for marine paleoseismology studies.

A review of environmental responsibility of project operations will be conducted by the chief scientist in charge of the survey operations prior to commencing the first day of operations. When new personnel will be in the crew, this training will be repeated at least for those new to the crew. They will be made aware of their individual responsibility and will be shown how to be aware of possible environmental impacts and how to mitigate them during the geophysical survey operations. Information relating to seasonality, as an indication of the types of animals that might be in our survey area, at the time of survey work will also be presented to the crew. A copy of this document will be provided to the crew of our survey vessel.

All personnel will be expected to be consistently aware that they are to be alert to any presence of marine wildlife while they are performing their duties. There are a number of signs/indications of marine wildlife presence and each crew member will be responsible to maintain vigilance for those signs within the constraints of their project duties. Some of those indications are:

a. Sounds - such as splashing, vocalizations (by animals and birds), and blowing (breathing).

b. Visual indications - birds aggregating, changes in water character such as areas of rippled water, white water caused by splashing, changes in color or shape of the ocean surface.

1.3 Survey Schedule and Layout

The survey is scheduled to commence field activities on October 6th and is expected to conclude October 17th, 2018. The survey will be conducted aboard the HSU R/V Coral Sea. The R/V Coral Sea will be departing and returning daily to Woodley Island Marina in Eureka harbor, and will be acquiring geophysical profiles from October 6th-17th. An image of the survey area is shown in Figure 1. The survey will be conducted along proposed track lines (Figure 1). Proposed track lines extend along the mainland shelf break and continental slope. The track lines run across multiple fault zones and submarine landslides, and will cover both State waters and Federal waters. The survey timing is designed to take advantage of relatively favorable annual marine conditions (low mean significant wave height and moderate seasonal winds). CHIRP and sparker profiles will be collected consistent with standard geophysical survey techniques. The survey speed will be approximately 3-5 nautical miles/hour.

There are no Marine Protected Areas (MPA) within the survey area. MPAs adjacent to the survey area are labelled in Figure 1.

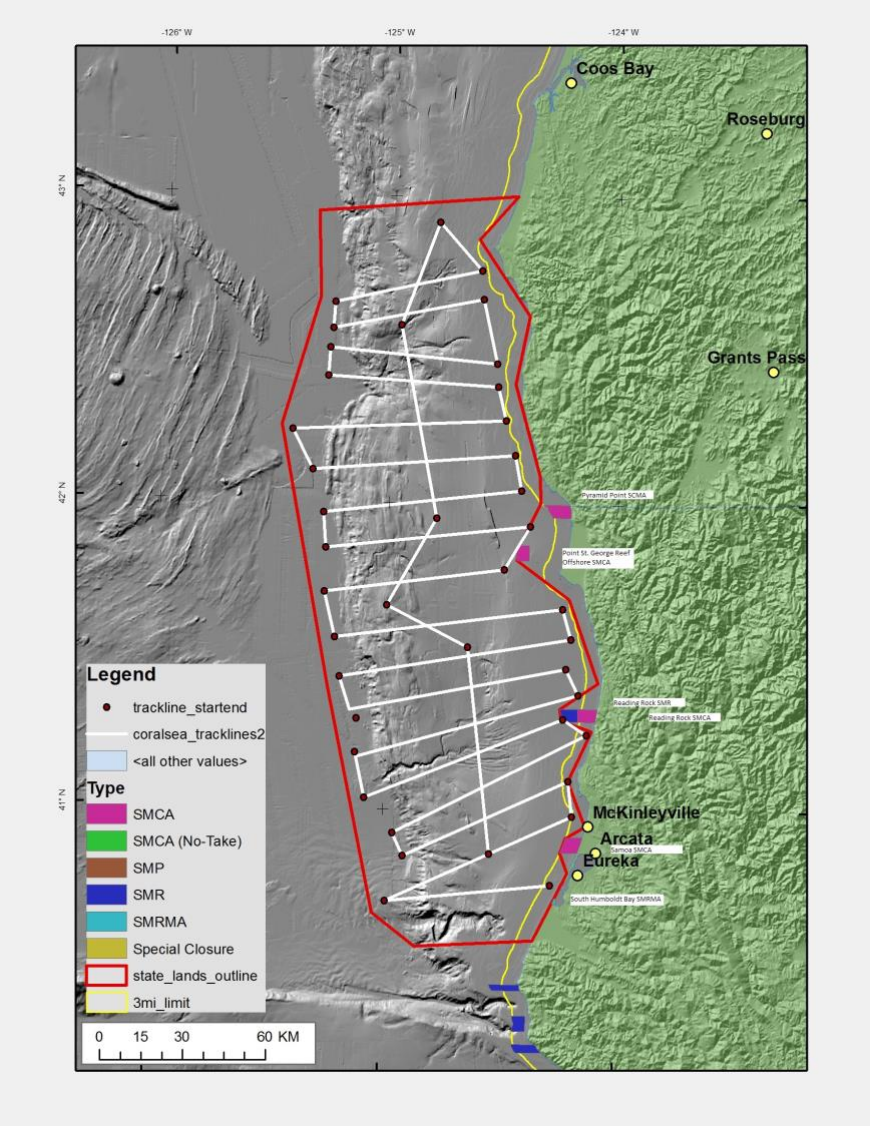


Figure 1. Region of Survey Area. Red lines are survey tracklines for daily operations onboard the R/V Coral Sea

2.0 Survey Equipment and Activities

The survey vessel will be the R/V Coral Sea, a 90 foot long, research vessel owned and operated by Humboldt State University (HSU). High resolutions sub bottom profile data will be collected during daylight hours using an Edgetech 512i CHIRP sonar fish that will be towed a few meters behind the survey vessel at water depths ranging from 1-5 meters. Sparker multi-channel profiles will also be collected in conjunction with CHIRP profiles.

PCMSC proposes to use the following equipment to collect the required data:

- Edgetech 512i CHIRP sub bottom profiler (active source).
- 1.2 kJ Sparker and Geometrics hydrophone array (active source)

The proposed survey will require the use of one marine vessel and in-water equipment that generate noise during data acquisition. The results of modeling of the noise generated by the survey equipment is shown in Table 1. Those results indicate that the area within which the 160 dB re: 1µPa rms sound level (the level specified by NOAA as potentially harmful to sensitive marine mammals) can be observed by monitors onboard the survey vessel. Because the acoustic data will be collected at an approximate speed of 3-5 knots, no area of the seafloor will fall within the sensitive sound level radius for more than about one minute.

Table 1. Distances to Received Pressure Levels from Equipment Sound Source

Sounder System	Frequency (kHz)	Source Level (dB peak)	Source Level (dB rms)	Distance toSL160 dB (rms) (meters)	Distance to SL 180 dB (rms) (meters)	Distance toSL190 dB (rms) (meters)
EdgeTech 512 Chirp	0.5-12 kHz	214	198	100	8	2.5
Applied Acoustics 1200 Mini Sparker	0.825	217	205	166	16	6

These estimates are based on the underwater sound propagation equation:

RSPL= SL-20log (R/Ro)-AR where,
RSPL=Received sound potential level
SL= RMS source level re. 1 uPa (rms) based on manufacturer's specifications
R= Distance
Ro= Reference Distance (1 m)
A= sound absorption coefficient

The greatest distance from the sound source to the 160 dB level (166 m) for the proposed equipment) is considered the "safety zone" for this equipment.

3.0 Marine Wildlife

3.1 Marine Wildlife

The following discusses the marine wildlife that have been recorded within the project region, those taxa that are most likely to be within the project region during the survey, and methods that will be instituted by the vessel operator to reduce or eliminate potential impacts to marine wildlife during transit and survey operations. Assigned Marine Wildlife Observers (MWO), the vessel master and others in the vessel wheelhouse will watch for marine wildlife and will institute the aforementioned mitigations.

Table 2 provides information on the seasonal variations in the marine wildlife that are expected to be or have been reported within the Project area.

Table 2: Abundance Estimates for Marine Mammals and Reptiles of California Unless Otherwise Indicated

Common Name *Scientific Name*	**Population Estimate**	**Current Population Trend**
REPTILES		
Cryptodira		
Olive Ridley turtle *Lepidochelys olivacea*	1.39 million (Eastern Tropical Pacific)**	Increasing
Green turtle *Chelonia mydas*	3,319-3,479** (Eastern Pacific Stock)	Increasing
Loggerhead turtle *Caretta caretta*	1,000 (California)**	Decreasing
Leatherback turtle *Dermochelys coriacea*	178 (California)**	Decreasing
MAMMALS		
Mysticeti		
California gray whale *Eschrichtius robustus*	18,017 (Eastern North Pacific Stock)	Fluctuating annually
Fin whale *Balaenoptera physalus*	2,624 (California/Oregon/Washington Stock)	Increasing off California
Humpback whale *Megaptera novaeangliae*	1,878 (California/Oregon/Washington Stock)	Increasing
Blue whale *Balaenoptera musculus*	2,046 (Eastern North Pacific Stock)	Unable to determine
Minke whale *Balaenoptera acutorostrata*	202 (California/Oregon/Washington Stock)	No long-term trends suggested
Northern right whale *Eubalaena japonica*	17 (based on photo-identification) (Eastern North Pacific Stock)	No long-term trends suggested
Sei whale *Balaenoptera borealls*	83 (Eastern North Pacific Stock)	No long-term trends suggested
Odontoceti		
Short-beaked common dolphin *Delphinus delphis*	343,990 (California/Oregon/Washington Stock)	Unable to determine
Long-beaked common dolphin *Delphinus capensls*	17,127 (California Stock)	Unable to determine
Dall's porpoise *Phocoenoides dalli*	32,106 (California/Oregon/Washington Stock)	Unable to determine
Harbor porpoise *Phocoena phocoena*	1,478 (Morro Bay Stock)	Increasing
Pacific white-sided dolphin *Lagenorhynchus obllquldens*	21,406 (California/Oregon/Washington Stock)	No long-term trends suggested
Risso's dolphin *Grampus griseus*	4,913 (California/Oregon/Washington Stock)	No long-term trends suggested
Short-finned pilot whale *Globicephala macrorhynchus*	465 (California/Oregon/Washington Stock)	No long-term trends suggested
Bottlenose dolphin *Turslops truncates*	684 (California/Oregon/Washington Offshore Stock)	No long-term trends suggested
	290 (California Coastal Stock)	No long-term trends suggested

Northern right whale dolphin *Llssopelphis borealis*	6,019 (California/Oregon/Washington Stock)	No long-term trends suggested
Sperm whale *Physeter macrocephalus*	751 (California/Oregon/Washington Stock)	No long-term trends suggested
Killer whale Orcinus orca	85 (Eastern North Pacific Southern Resident Stock)	Decreasing
	162 (Eastern North Pacific Offshore Stock)	No long-term trends suggested
Pinnipedia		
California sea lion *Zalophus californianus*	141,842 (U.S. Stock)	Unable to determine; increasing in most recent three year period
Northern fur seal *Callorhinus ursinus*	5,395 (San Miguel Island Stock)	Increasing
Guadalupe fur seal *Arctocephalus townsendi*	3,028 (Mexico Stock) Undetermined in California	Increasing
Northern (Steller) sea lion *Eumetopias jubatus*	2,479 California Stock	Decreasing
Northern elephant seal *Mirounga angustirostris*	74,913	Increasing
Pacific harbor seal *Phoca vitulina richardsi*	31,600	Stable
Fissipedia		
Southern sea otter *Enhydra lutris nereis*	2,711*	Unable to determine

Estimates provided by National Marine Fisheries Service (NOAA Fisheries 2011) *

Estimate provided by USGS (2010)

** Estimates provided by National Marine Fisheries Service (NMFS) (2004), Marquez, et al. (2002), Eguchi et al. (2007), Benson et al. (2007), and NMFS (2007). Estimates are based on number of current numbers of nesting females.

During the transit periods, there is a potential for encountering marine wildlife and therefore onboard monitoring will occur. Table 3 lists those species that are likely to occur in the survey area.

Table 3. Marine Wildlife Species and Most Likely Periods of Occurrence within the Survey Area

Family Common Name	Month of Occurrence [<1)]											
	J	F	M	A	M	J	J	A	S	O	N	D
REPTILES												
Cyptodira												
Olive Ridley turtle *(T)* [(2)]												
Green turtle (T)[(1),(2)]												
Loggerhead turtle (T) [(2)]												
Leatherback turtle (E) [(2)]												
MAMMALS												
Mysticeti												
California gray whale												
Blue whale (E)												
Fin whale (E)												
Humpback whale (E)												
Minke whale												
Sei whale (E)												
Northern right whale (E)												
Odontoceti												
Short-beaked common dolphin												
Dall's porpoise												
Harbor porpoise												
Long-beaked common dolphin												
Pacific white-sided dolphin												
Risso's dolphin												
Sperm whale												
Short-finned pilot whale												
Bottlenose dolphin												
Northern right whale dolphin												
Killer whale												
Pinnipedia												
Northern fur seal [(3)]												
California sea lion												
Northern elephant seal [(4)]												
Pacific harbor seal												
Guadalupe fur seal (T)												
Steller sea lion												
Fissipedia												
Southern sea otter (T) [(5)]												
Relatively uniform distribution		Not expected to occur					Most likely to occur due to seasonal distribution					

(E) Federally listed endangered species.
(T) Federally listed threatened species.
(1) Not Used
(2) Rarely encountered, but may be present year-round. Greatest abundance during July through September.
(3) Only a small percent occur over continental shelf (except near San Miguel rookery, May-November).
(4) Common near land during winter breeding season and spring molting season.
(5) Only nearshore (diving limit 100 feet).
Sources: Bonnell and Dailey (1993), NOAA Fisheries (2011), NCCOS (2007)

4.0 ONBOARD MITIGATIONS

4.1 Fishing Gear Clearance

In addition to submitting the required Notice to Mariners that will advise commercial fishers of pending on-water activities, prior to the start of each survey day, the vessel will traverse the proposed survey corridor for that day to note and record the presence of deployed fishing gear. No survey lines within 30 m (100 ft) of the observed fishing gear will be completed. The survey crew will not remove or relocate any fishing gear; removal or relocation will only be accomplished by the owner or by an authorized California Department of Fish and Game (CDFG) agent.

4.2 Survey Monitoring

At all times during survey activities, at least two designated marine wildlife monitors (MWO) will be present on the vessel. In addition, the vessel master has experience with marine wildlife monitoring and will observe and announce any sightings. The onboard MWOs shall have the authority to stop operations if a mammal or turtle is observed within the specified safety zone. We will make contact with the NOAA Long Beach office prior to commencement of operations to acquire information on the current composition and abundance of marine wildlife offshore and convey sighting data to the vessel crew and MWOs prior to departure. The certification of MWOs is provided in Appendix A.

The MWO will survey an area at least 200 m in all directions centered on the sound source (towed array behind the vessel) throughout the period of time that the survey equipment is operating. This 200 m visual range will encompass the 166 m safe radius distance.

If a monitor observes a marine mammal approaching the safety zone, the equipment will be shut down and will be re-started (ramped up) only when the MWO is assured that there is no longer the possibility of marine wildlife entering the safety zone.

The onboard monitors will have the authority to require that operations be stopped if a mammal or turtle is observed approaching the specified safety zone or appears to be negatively affected by the survey activities. The monitors will also have the authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e. fog) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation will be completed by the onboard monitors.

4.3 Mitigations During Transit and Survey

During daily transits, there is a potential for encountering marine wildlife. Onboard monitoring will be conducted by MWO's, the vessel master, and science crew. During transits the vessel will maintain a minimum distance of 100 m from observed animals. If the vessel master observes a marine mammal within the path of the transiting vessel, they will immediately slow the vessel and/or change course in order to avoid contact.

Cetaceans (whales) vary in their swimming patterns and duration of dives and therefore all shipboard personnel will be watchful as the vessel crosses the path of a whale or anytime whales are observed in the area.

If whales are observed during transits, the vessel master will institute the following measures:

- Maintain a minimum distance of 130 m from sighted whales;
- Do not cross directly in front of or across the path of sighted whales;
- When transit directions is parallel to whale path, maintain constant speed that is not greater than the whales speed, or alter transit direction away from whale path;
- Do not position the vessel in such a manner to separate female whales from their calves;
- If a whale engages in evasive or defensive action, slow the vessel and move away from the animal until the animal calms or moves out of the area.

During survey operations, the vessel will maintain survey a speed of 4-5 knots and will maintain a heading that coincides with survey track lines. If marine wildlife is observed within the vicinity of the vessel, the vessel master will take precautions to avoid proximity to marine wildlife (collision), ending and restarting the track line survey if necessary.

If a collision with marine wildlife occurs, the vessel master will document the conditions under which the accident occurred, including the following:

- Location of the vessel when the collision occurred (latitude and longitude);
- Date and time;
- Speed and heading of the vessel;
- Observed conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog);
- Species of marine wildlife contacted; and
- Organization, vessel ID and name of master in charge of the vessel at time of accident.

In accordance with NOAA requirements, after a collision, the vessel should stop, if safe to do so. The vessel may proceed after confirming that it will not further damage the animal by doing so. The vessel will then communicate by radio or telephone all details to the vessel's base of operations. The PCMSC Marine Operations Superintendent will contact the Stranding Coordinator, NMFS, Southwest Region, Long Beach, to obtain instructions. Alternatively, the vessel captain may contact the NMFS Stranding Coordinator for the

appropriate area directly using the marine operator to place the call or directly from an onboard telephone, if available to:

NOAA Southwest Regional Stranding Coordinator
National Marine Fisheries Service
501 West Ocean Blvd, Suite 4200
Long Beach, CA 90802-4213
562-980-3230
Contact: Justin Viezbecke
Email: justin.viezbicke@noaa.gov

NOAA Washington/Oregon Stranding Coordinator
National Marine Fisheries Service
7600 Sand Point Way, NE
Seattle, WA 98115
206-526-4747
Contact: Kristin Wilkinson
Email: kristin.wilkinson@noaa.gov

It is unlikely that the vessel will be asked to stand by until NOAA or CDFG personnel arrive, however this will be determined by the Stranding Coordinator. According to the MMPA, the vessel operator is not allowed to aid injured marine wildlife or recover the carcass unless requested to do so by the NOAA Stranding Coordinator.

Although NOAA has primary responsibility for marine mammals in both state and federal waters, the CDFG will also be advised that an incident has occurred in state waters affecting a protected species. Reports should be communicated to the federal and state agencies listed below:

Federal	**State**	**State**
Justin Viezbicke, Stranding Coordinator Southwest Region National Marine Fisheries Service Long Beach, California (562)980-3230	Enforcement Dispatch Desk California Department of Fish and Game Long Beach, California (562)590-5132	California State Lands Commission Division of Environmental Planning and Management Sacramento, California (916) 574-1938

4.4 Operational Measures

Operational measures to reduce impacts to marine mammals or turtles will include: 1) soft-start technique, 2) acoustic safety zone radii, 3) slow vessel speeds, 4) avoidance of pinniped haul out sites, and 4) limitations on equipment usage.

a) Soft Start

The soft-start technique will involve initiating the sparker at the lowest practical sound level, increasing the output in such a manner as to increase in steps not exceeding approximately 6 decibels per 5-minute period. During this time, MWOs will monitor the safety zone for marine mammal or turtle sightings.

b) Safety Zone Monitoring

The safety zone monitoring will follow the protocols outlined in Exhibit H of the Permit (PRC 8394), which sets a safety zone of 166 m for the sparker multichannel profiler as specified in Table 1. In the event that a pinniped haul out site is located within 91 m of the survey boundary, USGS will take the following measures:

- Not approach within 166 m of the haul-out site (consistent with NMFS guidelines of 91 m);
- Expedite survey activity in this area in order to minimize the potential for disturbance of pinnipeds on land;
- Have the MWM monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed;
- Pinniped haul out site locations are given in Table 4.

The vessel will continuously monitor the daily survey area to ascertain the presence, species and location of any marine wildlife is apparent in the intended survey area. The MWO and onboard personnel will be watchful as the vessel crosses this path or anytime whales are observed in the area. The vessel operator shall observe the following guidelines:

- Make every effort to maintain distance from sighted marine mammals and other marine wildlife;
- Do not cross directly in front of (perpendicular to) migrating whales or any other marine mammal or turtle;
- When paralleling marine mammals or turtles, the vessel will operate at a constant speed that is not faster than that of the animals;
- Care will be taken to ensure female whales are not separated from their calves; and, if a whale engages in evasive or defensive action, the vessel will reduce speed or stop until the animal calms or moves out of the area.

c) Vessel Speed

Survey speeds for CHIRP data acquisition will be approximately 3 to 5 knots for maximum data accuracy and data quality.

d) Limitations on equipment usage

Limitations on the frequency, pulse length, and pulse rate will be implemented to reduce

potential harmful noises. For the CHIRP system, the highest frequency band possible will be used and the shortest possible pulse length and lowest pulse rate will be used.

Table 4 Pinniped Haul Out Locations

LOCATION	SPECIES	LATITUDE	LONGITUDE
Smith River	*Harbor Seal*	*41.93*	*-124.20*
NW Seal Rock, Crescent City	*Stellar sea lion, CA sea lion*	*41.84*	*-124.38*
Crescent City	*Stellar sea lion*	*41.79*	*-124.32*
Reading Rock	*Stellar sea lion, CA sea lion*	*41.34*	*-124.18*
Turtle Rocks	*Stellar sea lion, CA sea lion*	*41.13*	*-124.18*
Flat Iron Rock	*Stellar sea lion, CA sea lion*	*41.06*	*-124.16*

4.5 Monitoring Reporting

A Post Survey Field Operations and Compliance Report will be submitted to CSLC staff as soon as possible but no more than 30 days after the completion of survey activities.

APPENDIX A: MARINE WILDLIFE OBSERVER CERTIFICATIONS

Since 2006, the USGS Pacific Coastal and Marine Science Center has provided trained marine mammal observers in support of low power geophysical surveys in California State Waters and Federal Waters under NOAA National Marine Fisheries (NMFS) jurisdictions. These surveys have been conducted under permit authorizations from California State Lands Commission (CSLC) (Permit# PRC 8394) and various NMFS Incidental Harassment Authorizations (IHAs) and Letters of Concurrence. PCMSC has provided training for 136 of their staff research scientists and science and technical support staff as marine wildlife observers (MWO) to support our geophysical surveys and meet our marine mammal mitigation obligations under pursuant to our CSLC and NMFS permit requirements.

The MWO training for our science and technical support staff is provided by Dr. James Harvey, a Professor of Marine Science at MLML and the Interim Director of MLML. Jim has taught courses on the biology and ecology of marine turtles, birds, and mammals for 22 years. Jim has also advised more than 70 graduate students as they obtained their M.S. degree, and has all of the instructional material (handouts, identification manuals, slides, video, etc.) for teaching this workshop.

The training has been conducted during several 2 day workshop at Moss Landing Marine Laboratories on the identification of marine mammal species, including handouts, slides, and video. All species of marine mammals in the area of planned USGS activities were discussed, their status and trends, and identifying features that allow species identification, and possibly differentiation between sexes and age classes. The workshop participants were instructed in the "normal" behaviors of marine mammals using visual explanations, slides, and video. A typical data sheet was prepared and participants were instructed how they would complete the data form. The rationale for the need for trained observers and importance of the data was emphasized. This training concluded with an observational cruise aboard an MLML vessel on Monterey Bay to observe the marine mammals discussed in the course in their natural setting and receive identification tips and other information in a field setting similar to that which they would expect during science operations.

PCMG Certified Marine Mammal Observers

Observer Name	Staff Position
Alicia Balliser-Gee	Science Support
Ginger Barth	Research Scientist
Jayne Bormann	Science Support
Daniel Brothers	Research Scientist
Katherine Coble	Research Scientist
Guy Cochrane	Research Scientist
Jamie Conrad	Research Scientist
Peter Dartnell	Science Support
Pete Dal Ferro	Science Support - Vessel Master
Theresa Fregoso	Science Support
Steven Hartwell	Science Support
Patrick Hart	Research Scientist
Sam Johnson	Research Scientist
Simon Klemperer	Research Scientist
Jared Kluesner	Research Scientist
Sean Paul LaSelle	Science Support
Tom Lorenson	Science Support
Brent Lunghino	Science Support
Tom Parsons	Research Scientist
Carol Reiss	Science Support
Ray Sliter	Science Support
Mike Torresan	Science Support
Peter Triezenberg	Science Support
Steve Watt	Research Scientist
Janet Watt	Research Scientist
Jenny White	Science Support - Vessel Master
Jeff Beeson	Science Support

APPENDIX B: VESSEL OPERATIONS DAILY PLAN

Operational Plan for USGS Northern California / Southern Oregon geophysical survey (10/6/2018 to 10/17/2018)

Note: The schedule below anticipates optimal circumstances in which there are no significant equipment problems and no days in which weather (e.g., excessive wind or large swells, heavy fog) restricts operations. Any of the above can result in schedule adjustments, however with good weather, the survey should be completed in within the proposed timeframe.

Day 1 - Day 12. October 6 (Saturday) through October 17 (Wednesday) daylight hours: Early AM departure from Eureka Harbor. Transit to survey area in Northern California and Southern Oregon. Collection of low-energy CHIRP and sparker subbottom profile data on indicated tracklines. Return to Eureka Harbor.

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE GEOLOGY SCIENCE CENTER

MANAGEMENT OF ACCIDENTAL DISCHARGE AND VESSEL INCIDENTS DURING OFFSHORE GEOPHYSICAL SURVEYS

1.0 INTRODUCTION

The survey operations will be conducted aboard the Humboldt State University Research Vessel Coral Sea, a 90 foot single screw vessel powered by twin Cummins KTA diesel engines. Because of the vessel's size, it is anticipated that response to any operational spills will be quickly identified and response will be initiated quickly and efficiently by the vessel master and on board designated vessel crew. At the initiation of each project or project phase, a spill management review will be conducted by the vessel master who is in all cases the responsible authority. Oil spills in United States (U.S.) marine waters shall be reported immediately.

2.0 OPERATIONAL SPILLS

Operational spills might involve one or more of the following substances carried on board the vessel: (i) fuel; (ii) lube oil; (iii) hydraulic oil; or (iv) waste oil. The vessel is equipped with woven polypropylene sheets (200 sheets) for rapid absorption of surface oil and protective gear, protective gloves and disposal bags. This oil spill kit is located in the forward cabin of the vessel. All of the liquids (listed below) that could cause a hazardous spill are either in the fuel tank or are located in the aft deck engine maintenance compartment of the vessel. Thus, if a spill occurred, these would be contained in the engine or maintenance compartments or, or if a grounding or instance occurred that punctured the gas tank, this would leak into the water, which is beyond the scope of our cleanup efforts. In the event a spill occurred in the engine compartment, the oil spill kit would be used to contain the hazardous liquids and the bilge would not be emptied until it could be pumped out at a hazardous waste facility.

(i) Fuel:

A spill kit shall be available for use in the event of a spill. If the fuel is spilled on the deck, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

(ii) Lube oil:

A spill kit shall be available for use in the event of a spill. If the oil is spilled on deck or in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

(iii) Hydraulic oil:

A spill kit shall be available for use in the event of a spill. If the oil is spilled on deck or in the machinery space, it shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

(iv) Pipe leakage:

The vessel master shall check the piping and rubber hose daily for leakage. Where leakage is found, it shall be repaired immediately, in the event of leakage, the vessel deck engineer shall secure valve(s) at the appropriate tank before repairing the leak. Spilled fuel on the vessel shall be immediately removed, bagged and disposed of at an appropriate hazardous waste reception facility. In the event of spillage in the water, the vessel master shall notify the Coast Guard and port facility.

3.0 EMPLOYEE TRAINING ON OIL SPILL CONTINGENCY PLAN

Prior to the launching of the vessel for any activities, all captain and crew members on the vessel will have read the Oil Spill Contingency Plan, understand procedures to be implemented in the event of an oil spill, and know where the oil spill kit is located on the vessel.

4.0 VESSEL FUELING

All vessel fueling will be conducted at an approved docking facility. No cross vessel fueling will be performed. Appropriate spill avoidance measures during filling procedures will be observed.

5.0 PRIORITY ACTIONS TO ENSURE PERSONNEL AND VESSEL SAFETY

Safety of vessel personnel and the vessel are paramount. In the event that a crewman's injuries require outside emergency assistance, the PCMSC safety officer shall be contacted immediately and emergency personnel contacted. While awaiting emergency assistance, the on board vessel master or qualified vessel crew personnel will render first aid and/or CPR. The nearest emergency medical facilities for this area is:

St. Joseph Health
2700 Dolbeer St., Eureka, CA 9550
(707) 445-8121

6.0 MITIGATING ACTIVITIES

If safety of both the vessel and the personnel has been addressed, the vessel master shall care for the following issues:

- Assessment of the situation and monitoring of all activities as documented evidence.
- Care for further protection of the personnel, use of protective gear, assessment of further risk to health and safety.

- Containment of the spilled material by absorption and safe disposal within leak proof containers of all used material onboard until proper delivery ashore, with due consideration to possible fire risk.
- Decontamination of personnel after finishing the cleanup process.

All personnel shall refer to the MSDS's on board for additional information.

7.0 EMERGENCY CONTACTS FOR STATE AND FEDERAL AGENCIES

Emergency numbers for U.S.C.G. for the San Francisco and Central Coast Areas are:

Pacific SAR Coordinator - Alameda: 510-437-3700

Rescue Coordination Center, Alameda: 510-437-3700

Any oil spill in U.S. marine waters shall be reported immediately to the following state and agencies:

West Coast Oil Spill hot-line	800-OELS-911, *or*
Department of Fish and Game CalTIP	888-CFG-CALTip
(Californians Turn In Poachers & Polluters)	(888-334-2258). *and*
U.S. Coast Guard National Response Center	800-424-8802
California Office of Emergency Services (OES)	800-OILS-911 or 800-852-7550.

During the phone call, the following information will be given over the phone.

a. Name and telephone number of caller.
b. Spill location
c. What was spilled (oil, gas, diesel, etc.)
d. Estimated size of spill
e. The date & time spill was identified (same day).
f. Any oiled or threatened wildlife
g. Source of spill, if known
h. Activity observed at the spill site

After taking the necessary actions, the spill will be reported in writing to the Governor's Office of Emergency Services on their forms.

Additionally, California Department of Fish and Game certified wildlife rescue/response organizations will be contacted about the spill. In the Northern California area, these include the following contacts:

Northcoast Marine Mammal Center	Marine Mammal Center
707-951-4722	415-289-7325

3200 Check-Out Procedure

Rack S/N: 027065
Amp S/N: 027061
Computer S/N: ? Chirp #1

Date: 9/29/2017
Performed by: [signature]

- Attach a keyboard, and mouse. Turn power amplifier on. Boot system. ☒
- Run *pickfish* application in Apps folder on desktop. Select SB512i towfish. ☒
  - Run Sub-Bottom acquisition software. Set: pulse power to 100%, ping rate @ 5 Hz.
  - Verify LED's on Rear panel work (where applicable) ☒TX1 ☒TX2.
  - Measure 12V on Rear Panel: 12VDC+/-0.5☐ Measured V=_____.
  - Measure Towfish Preamp Voltage on Rear Panel: 5VDC+/-0.5☐ Measured V=_____.

Towfish Model: SB-424☐ SB-0512I ☒
Towfish S/N: 027676
Tow cable Model and Length: Black wrapped cable.

- Using an oscilloscope, measure output voltage at the Amp output pins (see fig. 1). Measure each side with respect to ground. Typical readings range from 150vp-p to 200vp-p. Record results in table 1. on Chassis

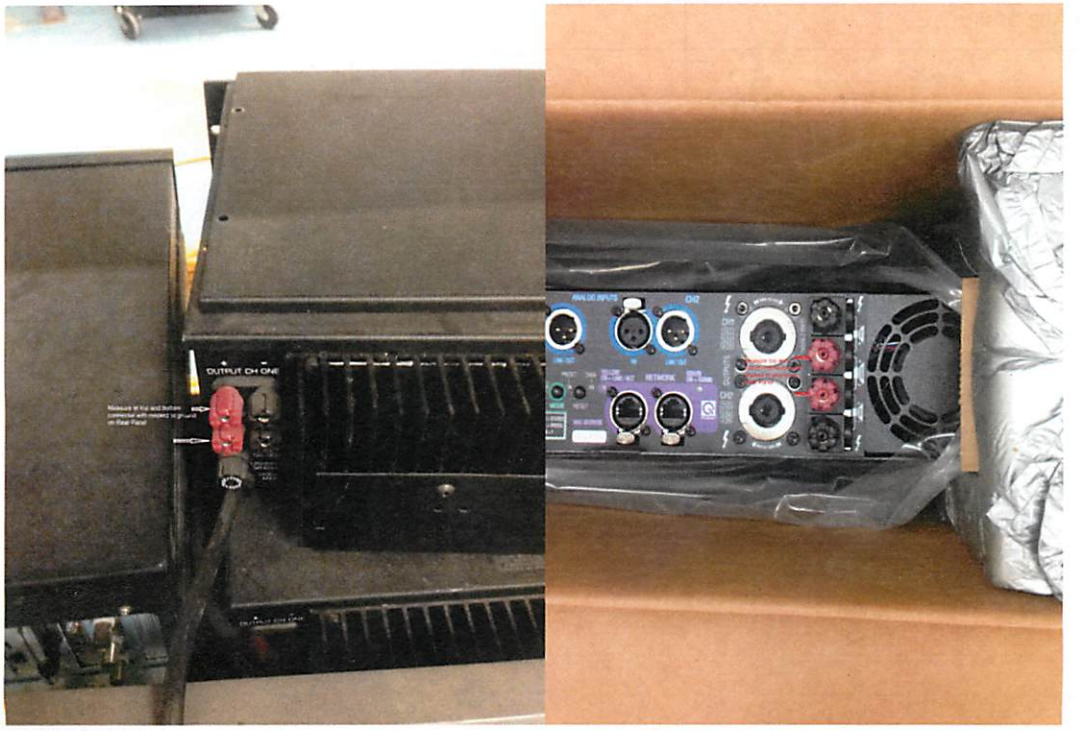


Fig. 1 (old & new style amp)

Table 1

Item	Pulse Description	V-pp @ 100% PP Side E	V-pp @ 100% PP Side H
512i	.5-2.7khz_100ms	165	165
512i	.4-4.0khz_40ms WB	160	164
512i	.5-4.5khz_50ms	179	180
512i	1.0-6.0khz_40ms	163	175
512i	.5-7.0khz_20ms WB	185	188
512i	.5-6.0khz_9ms	168	176
512i	.5-7.2khz_30ms	178	176
512i	.5-8khz_5ms	148	141
512i	.7-12khz_20ms	154	166
512i	1-10khz_5ms	144	154
512i	2-12khz_20ms	165	166
424	4-16 khz 10ms		
424	4-20 khz 10ms wb		
424	4-20 khz 10ms		
424	4-20 khz 5ms		
424	4-24 khz 10ms		
424	4-24 khz 5ms		

- Place the tow fish in water, and level.
- Verify that each pulse for the given tow fish has a minimum Signal Meter reading of 100 (see fig. 2).

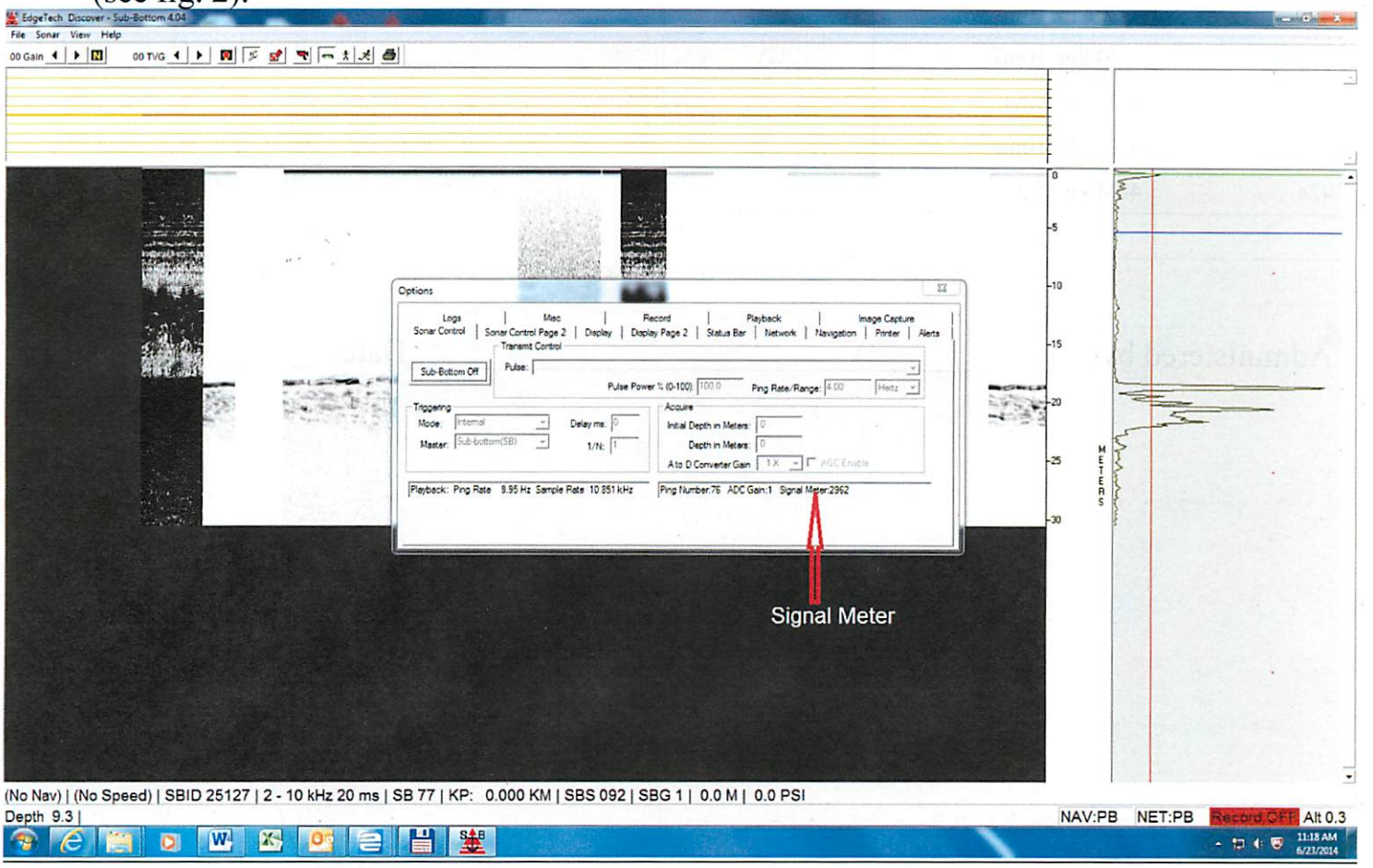


Fig. 2

- Note this in table 2

Table 2

Towfish	Pulse	Signal@100%
512i	.5-2.7khz_100ms	
512i	.4-4.0khz_40ms WB	
512i	.5-4.5khz_50ms	
512i	1.0-6.0khz_20ms	
512i	.5-7.0khz_20ms WB	
512i	.5-6.0khz_9ms	
512i	.5-7.2khz_30ms	
512i	.5-8khz_5ms	
512i	.7-12khz_20ms	

512i	2-12khz_20ms	
512i	1-10khz_5ms	
424	4-20 khz 10ms wb	
424	4-20 khz 10ms	
424	4-20 khz 5ms	
424	4-24 khz 10ms	
424	4-24 khz 5ms	

Administered by: _____ Date: _____

3200 Check-Out Procedure

Rack S/N: ?
Amp S/N: ?
Computer S/N: Chirp #2

Date: 9/29/2017
Performed by: Robert Mueller

- Attach a keyboard, and mouse. Turn power amplifier on. Boot system. ☒
- Run *pickfish* application in Apps folder on desktop. Select SB512i towfish. ☒
  - Run Sub-Bottom acquisition software. Set: pulse power to 100%, ping rate @ 5 Hz.
  - Verify LED's on Rear panel work (where applicable) ☒TX1 ☒TX2.
  - Measure 12V on Rear Panel: 12VDC+/-0.5☐ Measured V=_____.
  - Measure Towfish Preamp Voltage on Rear Panel: 5VDC+/-0.5☐ Measured V=_____.

Towfish Model: SB-424☐ SB-0512I☒
Towfish S/N: 027076
Tow cable Model and Length: Red _____.

- Using an oscilloscope, measure output voltage at the Amp output pins (see fig. 1). Measure each side with respect to ground. Typical readings range from 150vp-p to 200vp-p. Record results in table 1.

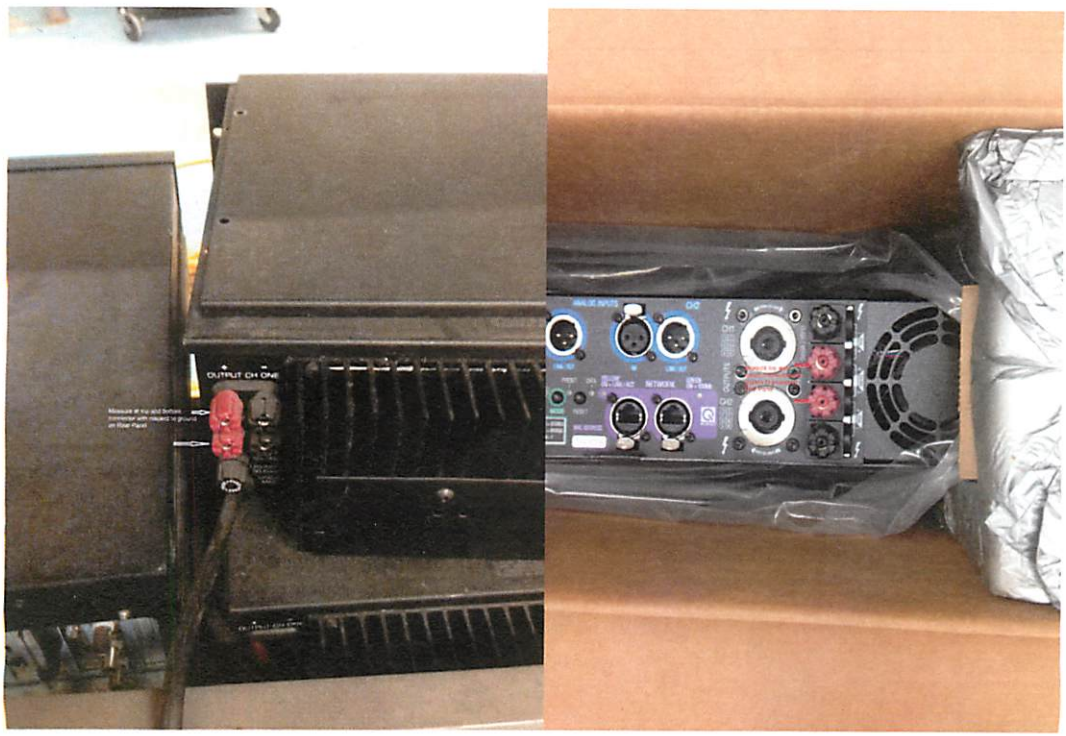


Fig. 1 (old & new style amp)

Table 1

Item	Pulse Description	V-pp @ 100% PP Side E	V-pp @ 100% PP Side H
512i	.5-2.7khz_100ms	163	161
512i	.4-4.0khz_40ms WB	160	157
512i	.5-4.5khz_50ms	176	174
512i	1.0-6.0khz_40ms	169	169
512i	.5-7.0khz_20ms WB	189	188
512i	.5-6.0khz_9ms	174	171
512i	.5-7.2khz_30ms	172	171
512i	.5-8khz_5ms	154	155
512i	.7-12khz_20ms	163	164
512i	1-10khz_5ms	155	154
512i	2-12khz_20ms	164	162
424	4-16 khz 10ms		
424	4-20 khz 10ms wb		
424	4-20 khz 10ms		
424	4-20 khz 5ms		
424	4-24 khz 10ms		
424	4-24 khz 5ms		

- Place the tow fish in water, and level.
- Verify that each pulse for the given tow fish has a minimum Signal Meter reading of 100 (see fig. 2).

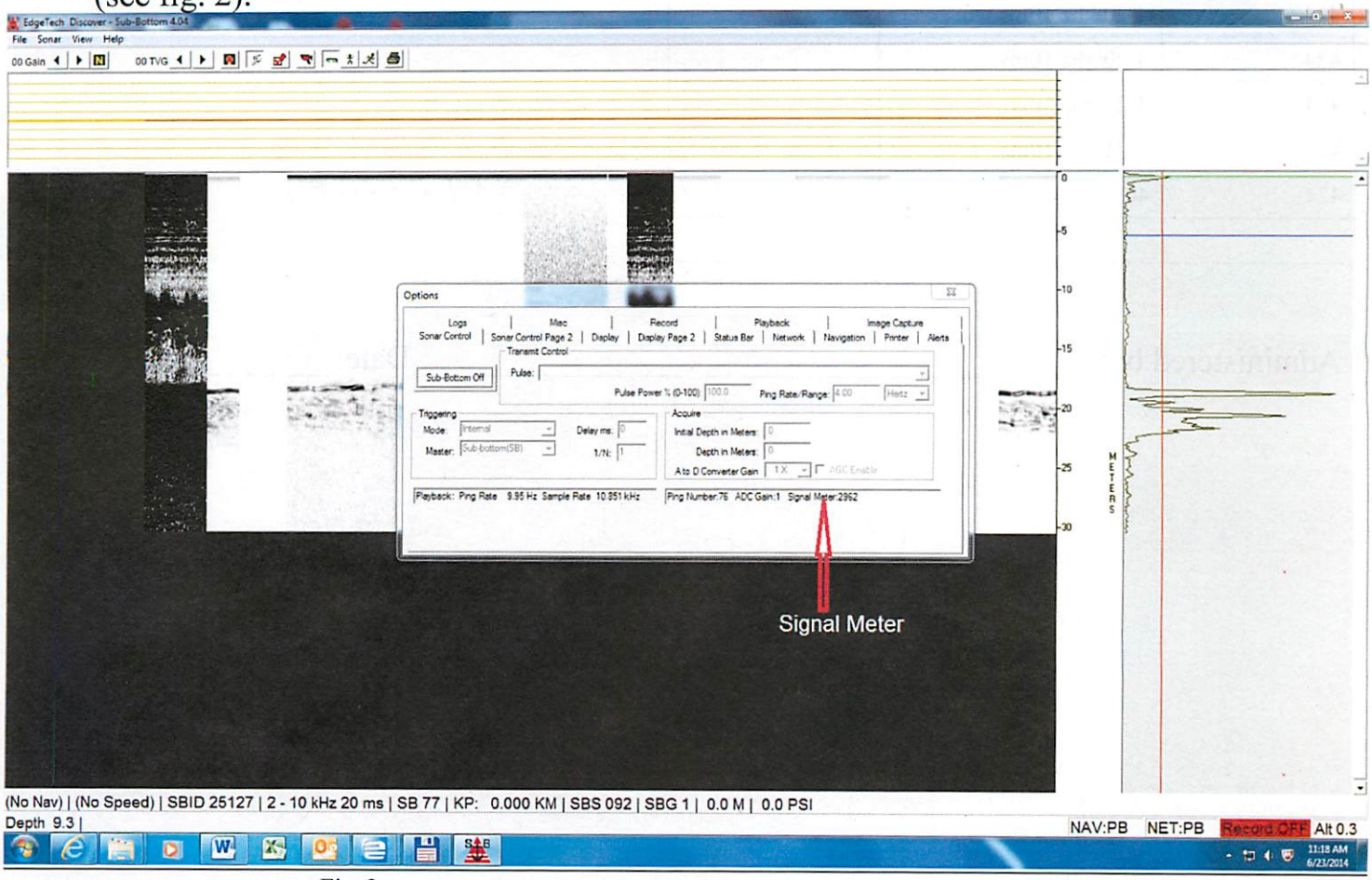


Fig. 2

- Note this in table 2

Table 2

Towfish	Pulse	Signal@100%
512i	.5-2.7khz_100ms	
512i	.4-4.0khz_40ms WB	
512i	.5-4.5khz_50ms	
512i	1.0-6.0khz_20ms	
512i	.5-7.0khz_20ms WB	
512i	.5-6.0khz_9ms	
512i	.5-7.2khz_30ms	
512i	.5-8khz_5ms	
512i	.7-12khz_20ms	

512i	2-12khz_20ms	
512i	1-10khz_5ms	
424	4-20 khz 10ms wb	
424	4-20 khz 10ms	
424	4-20 khz 5ms	
424	4-24 khz 10ms	
424	4-24 khz 5ms	

Administered by: _____ Date: _____

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE SCIENCE CENTER

GEOPHYSICAL SOUND SOURCE SYSTEMS MAINTENANCE RECORD

Edgetech 512i Chirp Sub Bottom Profiler

1.0 Introduction

The USGS Pacific Coastal and Marine Science Center (PCMSC) owns and operates a broad range of geophysical sound sources, seafloor mapping systems, geologic and geotechnical sediment sampling systems, and oceanographic instrument systems. This requires considerable technical and operational support to successfully undertake and complete its field programs. Operational and technical support for these systems is provided by the PCMSC Marine Operations Facility (Marfac) in Santa Cruz, CA. Our Marfac group is staffed by a team of ten ocean engineers, electronics technicians, and marine engineering technicians. They operate, maintain and repair all geophysical and oceanographic systems used to support all of PCMSC's scientific field operations.

The USGS-owned Edgetech Chirp 512i Sub Bottom Profiler sound source was given a thorough checkout and complete electrical test as per manufacturer's recommended procedures on June 29, 2016. All tests were passed and the system was determined to be within specified operational parameters.

Jenny White

Jenny White, Marine Operations Superintendant

6/29/16

Date

3200 Check-Out Procedure

Rack S/N: 027065
Amp S/N: 027061
Computer S/N: 391043

- Attach a keyboard, and mouse. Turn power amplifier on. Boot system. ☒
- Run *pickfish* application in Apps folder on desktop. Select SB512i towfish. ☒
- Run Sub-Bottom acquisition software. Set: pulse power to 100%, ping rate @ 5 Hz.
- Verify LED's on Rear panel work (where applicable) ☒TX1☒TX2.
- Measure 12V on Rear Panel: 12VDC+/-0.5☒ Measured V=11.9.
- Measure Towfish Preamp Voltage on Rear Panel: 5VDC+/-0.5☒ Measured V=5.01.

Towfish Model: SB-424☐ **SB-216A2**☐ **SB-216D** ☐ SB-512☐ SB-0512I ☒ **SB-0408**☐
Towfish S/N: 68186
Tow cable Model and Length: Standard 20m.

- Using an oscilloscope, measure output voltage at the Amp output pins (see fig. 1). Measure each side with respect to ground. Typical readings range from 150vp-p to 200vp-p. Record results in table 1.

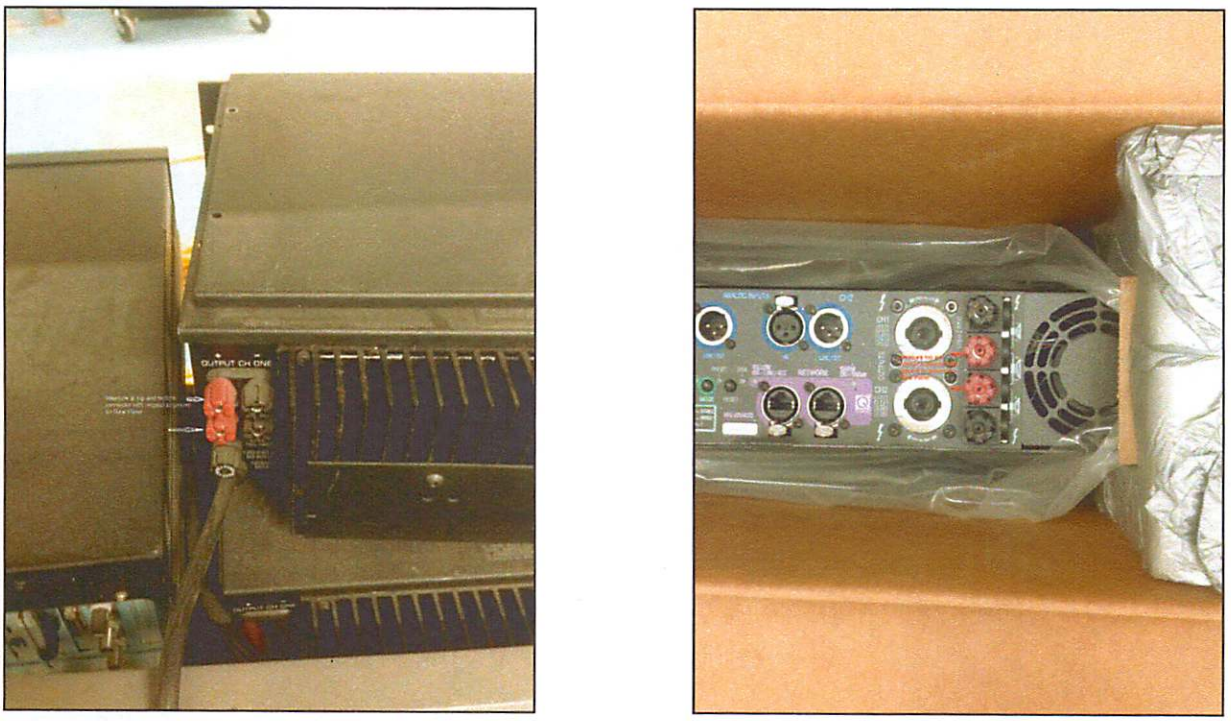
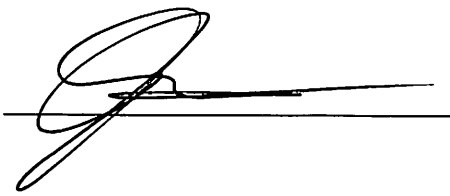


Fig. 1 (old & new style amp)

Table 1

Item	Pulse Description	V-pp @ 100% PP Side E	V-pp @ 100% PP Side H	Verify Not Clipping Side E	Verify Not Clipping Side H
512i	.4-4.0khz_40ms WB	80.72/-78.88	78.07/-80.45	X	X
512i	1.0-6.0khz_40ms	85.17/-85.27	84.45/-84.55	X	X
512i	.5-7.0khz_20ms WB	94.21/-96.11	94.81/-93.82	X	X
512i	.7-12khz_20ms (FM)	82.88/-82.98	82.16/-82.38	X	X
512i	2-12khz_20ms (FM)	82.04/-82.02	81.32/-81.41	X	X
512i	1-10khz_5ms (FM)	77.46/-78.16	77.10/-77.20	X	X
512i	.5-2.7 khz_100ms (FM)	80.72/-80.93	80.11/-80.21	X	X
512i	.5-4.5 khz_50ms (FM)	88.06/-88.28	87.34/-87.68	X	X
512i	.5-6.0 khz_9ms (FM)	87.46/-87.56	86.50/-86.96	X	X
512i	.5-7.2 khz_30ms (FM)	86.74/-86.83	85.65/-86.11	X	X
512i	.5-8.0 khz_5ms (FM)	78.67/-78.88	77.58/-78.16	X	X
512i	.5-2.7 khz_40ms (WB)	N/A	N/A	N/A	N/A

Administered by:  Date: 6/29/16

CALIFORNIA AIR RESOURCES BOARD TIER 2 ENGINE CERTIFICATION

MM-AIR-1: Engine Tuning, Engine Certification, and Fuels

The following information is provided as required for compliance with Mitigation Measure *(MM) AIR-1: Engine Tuning, Engine Certification, and Engine Fuels*. The Humboldt State University Research Vessel Coral Sea is a 90 ft., 1974 work boat purchased by Humboldt State University in 1998. In 2006 both main engines (low emission Tier II Cummins KTA 19M), reduction gears, shafts, propellers, exhaust system and engine controls were replaced.

These engines comply with IMO NOx limits and the comprehensive emission requirements (EU RCD and US EPA Tier 2, rating 5 Marine Leisure and rating 4 Marine Commercial).

Regarding the NOx emissions, MM AIR-1 states that daily NOx emissions should not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less. This vessel holds 200 gallons and we estimate maximum daily fuel consumption of 50 gallons.

See the Cummins KTA 19M Product Bulletin for the manufacturer's specifications for these engines.

KTA19 for Marine

Overview

373-522 kW | 500-700 hp

- Proven legacy in tough commercial marine environments, hard earned over the last 25 years
- Designed to withstand the challenging conditions commercial marine operators often face; this same reliable, durable power is now available for recreational boating applications, including super yachts and yacht support vessels
- IMO Tier I certified and many ratings are also IMO Tier II certified
- Covered by a comprehensive one year warranty and backed by Cummins global service network
- Built at Seymour Engine Plant in Seymour, IN, U.S. and Cummins India Limited in Pune, India

Specifications

Configuration In-line, 6 cylinder, 4-stroke diesel

Aspiration Turbocharged / Aftercooled

Displacement 19 L (1150 in^3)

Bore & Stroke 159 X 159 mm (6.25 X 6.25 in)

Rotation Counterclockwise facing flywheel

Fuel System Pressure Time (PT)

Product Dimensions and Weight

Overall Length	mm (in)	1877	(74)
Length of Block	mm (in)		

Overall Width	mm (in)	1003	(40)
Overall Height	mm (in)	1905	(75)
Overall Weight	kg (lb)	2073	(4570)

Dimensions may vary based on selected engine configuration.

Product Finder Specifications

Markets	**Marine** **Propulsion Engines** **Auxiliary Engines** **Recreational Marine** **Commercial Marine**
Certification Level	IMO Tier II IMO Tier I
Power	450 - 700 hp / 336 - 522 kW

Ratings

Commercial and Recreational Marine Propulsion Engines (Variable Speed Ratings)

Model	kW	MHP	BHP	Speed (RPM)	Rating	Emissions	Performance Curve
KTA19-M3	373	507	500	1800	Continuous	IMO 1	**FR4341**
KTA19-M3	395	537	530	1800	Continuous	IMO 1	**FR4342**
KTA19-M3	447	608	600	1800	Continuous	IMO 1	**FR4197**
KTA19-M3	447	608	600	1800	Continuous	IMO 2	**FR4585**
KTA19-M3	477	649	640	1800	Heavy Duty	IMO 1	**FR4223**
KTA19-M4	522	710	700	2100	Heavy Duty	IMO 1	**FR4278**

Marine Auxiliary Engines (Fixed Speed Ratings)

Model	kW	MHP	BHP	Speed (RPM)	Rating	Emissions	Performance Curve
KTA19-DM	336	456	450	1500 (50 Hz)	Prime Power	Not Certified	FR4291a
KTA19-DM1	358	487	480	1500 (50 Hz)	Prime Power	IMO 2	FR4347
KTA19-DM	392	532	525	1800 (60 Hz)	Prime Power	Not Certified	FR4291b
KTA19-DM	403	547	540	1500 (50 Hz)	Prime Power	IMO 1	FR4292a
KTA19-DM1	410	558	550	1500 (50 Hz)	Prime Power	IMO 2	FR4345
KTA19-DM1	425	578	570	1800 (60 Hz)	Prime Power	IMO 1	FR4346
KTA19-DM1	425	578	570	1800 (60 Hz)	Prime Power	IMO 2	FR4536
KTA19-DM	447	608	600	1500 (50 Hz)	Prime Power	Not Certified	FR4293a
KTA19-DM	462	629	620	1800 (60 Hz)	Prime Power	IMO 1	FR4292b
KTA19-DM1	485	659	650	1800 (60 Hz)	Prime Power	IMO 2	FR4537
KTA19-DM	507	690	680	1800 (60 Hz)	Prime Power	Not Certified	FR4293b

For more on marine emissions information, **click here**.

Features

Engine Design – Rugged in-line six cylinder designed for heavy duty applications. Replaceable wet cylinder liners for longer life and lower rebuild costs. Individual, four valve design cylinder heads for improved economy and performance. Gallery cooled pistons for maximum durability

Fuel System – Dependable Cummins PT fuel system can be operated mechanically or with CENTRY electronics for precise engine fueling. Step Timing Control (STC) allows for smooth engine acceleration under load. Premium fuel injectors utilize ceramic components for increased durability

Cooling System – Keel cooled or engine mounted heat exchanger system available. Spin-on Cummins water treatment filters for protection against cooling system corrosion

Exhaust System – Water cooled exhaust manifold reduces emissions and cools engine surface temperatures

Air System – Top mounted Cummins turbocharger with vertical or horizontal elbow, optimized for marine applications. Marine grade air cleaner with air inlet restriction indicator. Low temperature aftercooler available for increased efficiency. Cast iron water cooled exhaust manifold

Lubrication System – Marine grade steel or cast aluminum lube oil pan (72 L [19 gal]). Cummins spin-on oil filters available handed for simplified service

Electronics – 24 volt standard electrical system with 12 volt options available

Certifications – Complies with IMO Tier II emissions regulations. Certificates of compliance are available from the U.S. EPA and Lloyd's Register of Shipping. Consult your local Cummins professional for a complete listing of current marine agency approvals for this engine

Optional Equipment

- Direct mounted front power take-off
- **Duplex lube and fuel filtration**
- Engine room and pilot house instrumentation with analog gauges
- SAE A and B accessory drives
- Integral marine gear oil cooler
- **C Command PT panels**
- **CENTINEL™ oil management system**

Brochures Available

Search Our Complete Brochure Library for More Product Information >>

Title	Bulletin Number
2018 Marine Products Guide	3381946
Commercial Marine Fishing And Tugboat Engines From 325 HP To 800 HP Brochure	4082103
K19 Marine Overhaul Kit Flyer	2878912
KTA19 Commercial And Recreational Marine Spec Sheet	4087449
KTA19 Commercial And Recreational Marine Spec Sheet - A4 Format	4087450
Marine Commercial Transport Brochure	4082096
Marine Defense Brochure	4087453
Marine Encompass Brochure	5410920

Technical Documents Available

Title	Bulletin Number
C Command PT Elite Plus Wiring Diagram	5303996
KT/KTA19-M/M3/M4 Marine Engine General Datasheet	DS-4964
KT19-M Marine Performance Curve 272 kW (365 hp) @ 1800 RPM	M-4007
KT19-M Marine Performance Curve 283 kW (380 hp) @ 1800 RPM	M-4096
KT19-M Marine Performance Curve 351 kW (470 hp) @ 1800 RPM	M-4221
KT19-M Marine Performance Curve 380 kW (510 hp) @ 2100 RPM	M-4095
KTA19-D(M) Marine Auxiliary Engine General Datasheet	D193097
KTA19-D(M1) Marine Performance Curve 485 kW (650 hp) @ 1800 RPM	FR-4344
KTA19-M (CENTRY) Marine Performance Curve 410 kW (550 hp) @ 2100 RPM	M-4243
KTA19-M Marine Performance Curve 395 kW (530 hp) @ 1800 RPM	M-4222
KTA19-M Marine Performance Curve 410 kW (550 hp) @ 2100 RPM	M-4180
KTA19-M/M3/M4/D(M1) Subsystem Marine Installation Drawing	3170628
KTA19-M4 (CENTRY) Marine Performance Curve 522 kW (700 hp) @ 2100 RPM	M-4198
Marine Centry K/KV Series Wiring Diagram	3866032
Mechanical K/KV/N Wiring Diagram	3349357

Case Studies Available

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Title
“Bling” in the Engine Room
A Fleet Owner’s Pleasure
A River Life: Hard Start & Big Rewards
Argentina Continues to Build Fleet
Beautiful Pearl: Dinner on the Chao Phraya River
Bollinger Delivers to Beemar Inc.
Bulk Shipping and Lightering
Coastal Tankers: A Vital Link
Coastal Tankers: A Vital Link
Combination Boat Joins Oregon Fleet
Crowning the Decade’s Crew Supply/Boats
Cummins Gen Sets for Crane Barge

Cummins In Hong Kong, Keeping up the Quality

DongGuan Nanxiang Shipbuilding

Efficient New Dinner Cruiser

Esvagt's Emergenchy Vessels

Fijian Vessel to a Practical and Versatile Design

Four Times 500 HP For Colombian River

FV Natalia: Keeping On Keeping On

GMG International Shipbuilding: Lift Boat

Goa's Casino Royale at Three

Greek Ferry: Four Legs for Power

Gulf of Mexico Crewboats Keep On Going

Kara-Matt: Repower After Big Hours

Mainport: People and Business from Ireland to Malaysia

Make Over for Landing Craft

Manaus: A Port on a Hill

Manaus: Deepsea Inland Port

New Power for Handsome Tug

New Trawler for Argentine Family

Nongsa Jaya Buana: Tugs for All Jobs

One Hundred New Fishing Boats

Philippine Fleet Builds for Reliability

Philippine Landing Craft

Pushboats for the Amazon

Pushing on Brazil's Rio Madeira

Rajang Maju's Handy Size Tug

Re-Thinking the Re-Power

Reducing Emissions in Southern California

Reliability, Good Power, Low Fuel Consumption

River Borne Containers

S.P. Inter Marine Expands Cargo Handling

Sand Boats: Bigger and Better

Silverburn: Ice-Class AHT for Caspian Ops

Sister for Successful Argentine Trawler

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Cummins Inc, Box 3005,
Columbus, IN 47202-3005 USA

U.S. GEOLOGICAL SURVEY
PACIFIC COASTAL AND MARINE SCIENCE CENTER

GEOPHYSICAL SOUND SOURCE SYSTEMS MAINTENANCE RECORD

Applied Acoustics CSPD 2400J Delta Sparker

1.0 Introduction

The USGS Woods Hole Coastal and Marine Science Center (WHCMSC) owns and operates a broad range of geophysical sound sources, seafloor mapping systems, geologic and geotechnical sediment sampling systems, and oceanographic instrument systems. This requires considerable technical and operational support to successfully undertake and complete its field programs. Operational and technical support for these systems is provided by the WHCMSC Marine Operations Facility (MOF) in Falmouth, MA. Our MOF group is staffed by a team of ocean engineers, electronics technicians, and marine engineering technicians. They operate, maintain and repair all geophysical and oceanographic systems used to support all of WHCMSC's scientific field operations.

The USGS-owned Applied Acoustics CSPD-2400 Delta Sparker sound source was purchased new and the manufacturer guarantees the equipment is within specified operational parameters and fully compliant with Applied Acoustics stated capabilities and specifications.

Jane F. Denny

Jane Denny, Marine Operations Manager

9/10/2018

Date:

Keen, Kelly@SLC

From: Elfers, Timothy <telfers@usgs.gov>
Sent: Tuesday, September 11, 2018 2:33 PM
To: clerk@humboldtbay.org; charlie@ccharbor.com
Cc: Keen, Kelly@SLC; Greenwood, Richard@SLC; Joanne C. Ferreira
Subject: PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY - Harbor Masters
Attachments: CSLC EXHIBIT F - Watt Coral Sea Chirp_Sparker Oct2018_te.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

The USGS Pacific Coastal and Marine Science Center (PCMSC) will be conducting a geophysical survey in the Northern California / Southern Oregon area under California State Lands Permit #8394. Operations will include two sub-bottom profilers towed by Humboldt State's 90-foot research vessel R/V Coral Sea. The survey will be conducted from October 6 – October 17, 2018.

In keeping with our California State Lands Permit requirements, we are providing you with the attached Geophysical Pre-Survey Notice for your information.

--
Tim Elfers

Marine Operations Manager
U.S. Geological Survey
Pacific Coastal Marine Science Center

Marine Facility
2831 Mission St
Santa Cruz, CA 95060

831-460-7479 office
831-332-9665 cell
831-421-9209 fax

Keen, Kelly@SLC

From: Elfers, Timothy <telfers@usgs.gov>
Sent: Tuesday, September 11, 2018 2:37 PM
To: SLCOGPP@SLC; D11LNM@uscg.mil; andrew.w.phelan@uscg.mil
Cc: Fabel, Joseph@SLC; Keen, Kelly@SLC; Greenwood, Richard@SLC
Subject: PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY - Geophysical Coordinator
Attachments: CSLC EXHIBIT F - Watt Coral Sea Chirp_Sparker Oct2018_te.pdf

Follow Up Flag: Follow up
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Santa Cruz, CA 95060

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831-332-9665 cell
831-421-9209 fax

Keen, Kelly@SLC

From: Elfers, Timothy <telfers@usgs.gov>
Sent: Thursday, September 13, 2018 1:52 PM
To: Keen, Kelly@SLC; Greenwood, Richard@SLC; Joanne C. Ferreira
Subject: Fwd: PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY - Dive Shops
Attachments: CSLC EXHIBIT F - Watt Coral Sea Chirp_Sparker Oct2018_te.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

forgot to cc: you all on the dive shop email.
Tim

---------- Forwarded message ----------
From: **Elfers, Timothy** <telfers@usgs.gov>
Date: Tue, Sep 11, 2018 at 2:34 PM
Subject: PRE SURVEY NOTIFICATION FOR GEOPHYSICAL SURVEY - Dive Shops
To: info@pacificquestdivecenter.com, dan@live2dive.biz

The USGS Pacific Coastal and Marine Science Center (PCMSC) will be conducting a geophysical survey in the Northern California / Southern Oregon area under California State Lands Permit #8394. Operations will include a sub-bottom profiler towed by Humboldt State's 90-foot research vessel R/V Coral Sea. The survey will be conducted from October 6 – October 17, 2018.

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Tim Elfers

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